A COMPARISON OF MASSED AND SPACED EXPOSURE IN THE TREATMENT OF CLIENTS PRESENTING WITH DISPROPORTIONATE DENTAL ANXIETY

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by

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A thesis submitted to the School of Graduate
Studies in partial fullfillment of the
requirements of the degree of
Master of Science

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March, 1990

St. John's Newfoundland

ISBN 0-315-59202-8

Abstract

This study examined the differential effects of varying intersession interval in a sample of clients presenting with disproportionate dental anxiety. Twelve volunteer clients, consisting of nine females and three males, were randomly assigned to one of two treatment groups: (a) once weekly sessions for four weeks (spaced); (b) twice weekly sessions for two weeks (massed). The treatment was identical for both groups except for the interval between treatment sessions. The behavioural treatment programme was comprised of imaginal exposure and anxiety management techniques. Outcome was measured by three subjective self-report questionnaires and two behavioural measures. Two hypotheses were tested: (1) that a massed treatment programme would be superior to a spaced programme; (2) that there would be a predictable pattern between response channels occurring between beginning and end of treatment. Results indicated that although all subjects reduced their anxiety enough to attend a dental appointment, there was not sufficient evidence to support the superiority of one programme over the other. In addition, the second hypothesis was only partially confirmed. Significant group differences were found only at the end of the treatment programme but not at follow-up. The massed group demonstrated lower scores in a more concordant manner over all dental situations as compared to those scores obtained by the spaced group.

Acknowledgements

I would like to express sincere thanks and gratitude to Dr. Andree Liddell for her contribution to this thesis, especially her continuing support and encouragement when the end was not always in sight. I am grateful for the comments and help given by my committee members, Dr. Abraham Ross and Dr. Chris Bilsbury. Thanks to the School of Graduate Studies for their financial support.

To my office mates, Bryan Acton and Heather Dalziel, many thanks for the help, support, and laughs over the past years. To Roberto Di Fazio, a heartfelt thank you for your encouragement and comments, but most of all, for your patience.

Table of Contents

List of Tables

List of Figures

Introduction

Early studies of behaviour therapy outcome relied on overt behaviour. For instance, Wolpe's practice of systematic desensitization depended heavily on overt behaviour to demonstrate reductions in anxiety responding. In the 1950s, he discovered that he was able to extinguish a conditioned neurotic anxiety response in animals (not eating in the home cage) by introducing dissimilar environmental stimuli which signalled safety. By progressively increasing the similarity of the environment to the home cage, the animal regained regular eating habits. Based on these experiments, Wolpe then integrated Jacobson's (1938) deep muscle relaxation into his therapy of systematic desensitization as a source of "counter-conditioning", that is, the relaxed state produced effects opposite to those produced by anxiety, for example, decreased autonomic arousal. Furthermore, the relaxed state produced decrements in anxiety responding when the fearful stimulus was presented, hence, counter-conditioning. These effects were obtained by imaginal, as well as in vivo exposure.

Cognitions, according to Wolpe (1982), are a subset of behavioural responses. Since they are internal, private events, he proposed that images were "specific neural events" which formed a part of a pattern previously evoked by specific external stimuli but both sharing the same neurophysiology. Lang (1977) suggested that an important problem was that the initiating stimulus in therapy was a set of instructions directing the manner in which the client was to use

imagination, not a "neural event". Furthermore, the complex neurophysiology implied by the proposal made direct manipulation difficult. Lang (1977) suggested a simpler explanation which examined the ways in which cognitions could be processed. Based on the relationship observed between physiological reactivity to fear imagery and successful therapeutic outcome, Lang (1968) suggested that the psychophysiological structures underlying imagery may be a key to the emotional processing of a fear. He suggested that fear responses could be measured not only behaviourally, but also cognitively and physiologically. An individual brings with a fear response not only the overt behaviour, but also the covert feelings and the meaning which has been attributed to the stimulus.

Lang (1968) did not emphasize any one modality, rather, he viewed them as a "loosely coupled system". He asserted that information is processed, organised, and stored by way of propositional structures (Lang, 1977). These structures contain information about the relationships, descriptions, and interpretation of external stimuli. To simplify information storage, the brain has prototypes which are analogous to basic blocks of information to which other information is compared. By stimulating fear prototypes through exposure, Lang (1977) asserted that fear can be processed by the three response modalities leading to a more successful treatment outcome. The better the match of the exposure to the fear prototype, the more likely it would be to have full evocation of the fear responses. Fear evocation can be enhanced through imagery training (Lang, 1983), focussing on response information (Foa & Kozak, 1986), and focussed attention to the exposure treatment (Grayson, Foa, & Steketee, 1982).

The reviewed literature was chosen to show the direction in which research on

emotional processing has taken. A relationship has been observed between the three response systems, therefore, empirical evidence supporting this observation is presented. From this research, habituation has been repeatedly presented as an important factor in therapeutic outcome. As such, a summary of its role in exposure therapy is necessary. In spite of the efficacy of the three systems model in explaining the processing of fear responses, and its popularity among researchers, there are criticisms of the model and these are included in the review.

Relationship between the response channels

Much research has been conducted to investigate the extent of the relationship between the behavioural, cognitive, and physiological channels of fear responding. Various types of measures have been used on both simple and complex phobias with fairly consistent results.

Lang, Melamed, and Hart (1970) obtained significant findings in an extensive psychophysiological analysis of the desensitization process. Using respiration, muscle potentials, heart rate, galvanic skin response (GSR), and self-report, they found a consistent relationship between physiological reactivity, fear imagery, and treatment outcome. Their results demonstrated that heart rate increases were significantly related to verbal reports of anxiety when presented with items previously judged on the fear hierarchy as most distressing. When the highest items on the fear hierarchy were visualized, there was a linear trend between anxiety rating and hierarchy position. Visualized scenes of increased hierarchical ranking were associated with increases in heart rate and GSR. In addition, those subjects who verbally reported and demonstrated higher heart rates physiologically, demonstrated better outcome.

In describing the relationship between fear and avoidance, Rachman and Hodgson (1974) borrowed Lang's (1968) description of fear and described the movement within the system as concordance/discordance and synchrony/desynchrony; terms which are similar but not interchangeable. They suggested that when fear and avoidance are compared at one point in time and are found to have a high correlation, then it can be said that they are concordant. Conversely, if the correlations between the two are low at one point in time, they are said to be discordant. Synchrony and desynchrony can be viewed as concordance (or discordance) over time, hence it describes *changes* in the relationship between fear and avoidance over time. Hodgson and Rachman (1974) proposed five hypotheses dealing with the effects of concordance and synchrony on treatment outcome. The first proposed that the three response channels would more likely be concordant during strong emotional arousal than under weak arousal, thus, the goal of treatment would be to attain changes in all three channels. This in turn would support treatment efficacy. Sartory, Rachman and Grey (1977) found a high concordance between mean heart rate and subjective fear report during high arousal, thus supporting the initial part of the hypothesis. Avoidance behaviour was held constant, therefore its movement was not examined. Vermilyea, Boice, and Barlow (1984) found that heart rate decreases were significant for synchronous subjects while desynchronous subjects showed nonsignificant changes. Contrary results were obtained by Kaloupek and Levis (1983). They found that a touch/no-touch classification was an acceptable criterion to establish a level of arousal. More specifically, a no-touch subject was assumed to be more highly aroused than a subject who was able to touch the

feared stimulus. They used this criterion in an investigation of response concordance in snake phobics. Their findings did not support Hodgson and Rachman's (1974) hypothesis that concordance would be higher during strong emotional arousal. Kaloupek and Levis (1983) found that the touch subjects (lower arousal) showed relatively greater concordance among measures than no-touch subjects and that these differences were not due to statistical artifacts.

Hodgson and Rachman's (1974) second hypothesis asserted that low levels of demand will demonstrate concordance while high levels will facilitate divergence between the three channels. They suggested that motivation can play an important role in discordance. If the subject is highly motivated to stay within a fearful situation, in spite of increasing levels of physiological and cognitive anxiety, then behaviour can become separated from the other two modalities, producing discordance.

The essence of Hodgson and Rachman's (1974) third hypothesis, was that the degree of synchrony achieved from therapy will be a function of the therapy technique utilized. The level of demand imposed by the therapy differentially affects the changes that occur over the response systems, more specifically, a high demand therapy would be associated with desynchrony. Flooding, which places a high level of demand on the individual, and desensitization, which places a low level of demand were the treatments compared by Grey, Sartory, and Rachman (1979). They found some support for this hypothesis. Desynchrony was observed between sessions 1 and 2 for the high demand group, and they exhibited a return of fear at the beginning of session 2. Similar results were found for the increasing-demand group, while the low demand group demonstrated synchronous changes

and no return of fear. Unfortunately, this synchronous pattern was not maintained throughout treatment.

The fourth hypothesis postulated that increased concordance could be observed during a follow-up period. Reanalysis of data by Rachman, Marks, and Hodgson (1973) illustrated that concordance between the three response channels had increased at 6-month follow-up although it followed two directions. Therapeutic "successes" were described as having their lagging response modalities catching-up to the behavioural index, while the behavioural channel of those considered as "failures" were seen to have slipped back to the level of the other modalities, thus both groups achieved increased concordance. Some support is obtained from Shahar and Marks (1980) in their study of obsessive-compulsives. They found that physiological symptoms (i.e., heart rate) decreased before improvement was seen in clinical ratings. Long-term follow-up was not available. Further support is obtained from Marshall (1985) in his study of acrophobics. While the different groups received various durations of exposure, one group received in addition to their exposure, coping self-statement training. This group exhibited the greatest improvement and continued to improve at 4-week follow-up.

Lastly, it was postulated that desynchrony between physiological and other measures will be greater for skin conductance than for heart rate. Hodgson and Rachman (1974) cite studies which provide evidence to support the view that there is a stronger relationship between heart rate and other indices of anxiety responding than there is for skin conductance. Borkovec and Sides (1979) found no significant results on basal skin conductance scores. There was a tendency for

a therapy by time interaction for heart rate scores, however, it occurred opposite to the predicted direction.

Emotional Processing

Although there had been similar observations and findings from various sources regarding the processing of fear, it was not until Rachman ('80) coined the term "emotional processing" that these disconnected sets of information were brought under the same conceptual framework. Emotional processing has been described by Rachman (1980) as a means by which "emotional disturbances are absorbed" after which they decline to allow the individual to return to daily activities without disruption. According to Rachman (1980) three aspects of abnormal fear can be viewed as unsatisfactory emotional processing: the undue persistence of a fear, the unprovoked return of fear, and the incubation of fear. Unsatisfactory processing can be manifested directly and/or indirectly. Obsessions, disturbing dreams or thoughts, and inappropriate expression of emotion are samples of direct manifestations. Indirect signs can include fatigue, insomnia, attentional difficulties, and subjective distress. Both types of symptoms have to persist for an inordinate length of time in order to be predictive of insufficient emotional processing. Rachman (1980) suggested that the best way to determine if emotional processing has occurred is to use test probes. The extent of processing can be ascertained by the degree of responding to the probe. If after an optimal time period, the probe still elicits a distressed reaction, processing has not yet occurred. Probes are best used in conjunction with the symptomatology outlined above.

While Rachman stresses the characteristics of the person and the responses

that are elicited, Lang presents a mechanistic perspective in comparison. Lang (1977) uses cognition, propositional structures, and information processing to help explain the way in which people emotionally process fear responses. To investigate emotional processing, Lang (1977) used response training to enhance psychophysiological responding during imaginal exposure. One group was stimulus trained, that is, was told to focus on the perceptual content of the image and was verbally reinforced for elaborating on these description. The experimental group or the response trained subjects, were told to focus on somatomotor and visceral responses associated with the scene. They were reinforced for reporting responses like "breathing...rapidly as you run...". Results showed that the response trained group generated the largest and most consistent physiological responses. These responses were specific to the propositional structure of the scene, i.e., an active scene elicited active physiological responses, whereas a neutral scene elicited less responding. These results are supported by further research from Miller, Levin, Kozak, Cook, McLean, Carroll, and Lang (1981), and Lang (1983). In addition, it has been show by Lang, Melamed, and Hart (1970) that successfully treated subjects had higher physiological arousal from exposure to imagined scenes. High physiological arousal can be linked to successful treatment through completed emotional processing. Similar results have been found by others (Borkovec and Sides, 1979; Craske, Sanderson, and Barlow, 1987; and Marshall, 1985; 1988).

Although Foa and Kozak's (1986) premise follows Lang's concept of the informational structure of emotion, their theory embodies the addition of corrective information. More specifically, after activation of the fear structure,

sufficiently incompatible information must be incorporated into the patient's memory structures to take the place of the previously refuted beliefs. Again, similar to Lang (1977), Foa and Kozak (1986) view exposure as a means of inducing emotional processing. However, they suggest that failure to respond to the fear stimulus does not necessarily mean successful processing but rather it could indicate that the evoking stimulus is inadequate. Foa and Kozak (1986) used three indicators as evidence supporting the activation of the fear structure and the processing of emotional responses and used these as indications of emotional processing: (1)the physiological responses and subjective ratings of fear are usually used as evidence of fear activation. The basis of this has been demonstrated by patients who showed initial increased heart rates to feared stimuli and were more likely to have positive outcomes from treatment. Those patients who were "weak responders" were less likely to have successful outcomes (Borkovec & Sides, 1979; Lang, Melamed, & Hart, 1970); (2) habituation to exposure within a session is a good indication that emotional processing has occurred. With repeated presentations of a fear stimulus, initially high heart rates usually decrease steadily throughout the session. This pattern is found in imaginal and in vivo exposure and usually follows a fairly linear pattern (Grayson, Foa, & Steketee; Lang, Melamed, & Hart, 1970); (3) emotional processing usually elicits a between-sessions habituation effect. The initial presentation at the beginning of each consecutive session elicits a progressive decrease in responding. This was supported by Grayson, Foa, and Steketee (1982).

The incompatible information that is presented during exposure sessions usually disconfirm erroneous beliefs held by the patient. For example, decreasing

levels of physiological and subjective arousal allow the patient to entertain the idea that a disaster will not occur. This in turn weakens the association between fear and avoidance. Further evidence is provided by Marshall (1985) who obtained greater improvement in a group which had received coping self-statements in addition to in vivo exposure.

Role of habituation in exposure therapy

Much research has examined the role of habituation in emotional processing and treatment outcome. From this, it has been postulated that habituation may be a mechanism underlying emotional processing. Habituation, for the present purpose, is defined as the decrement in arousal observed over time when an anxiety-provoking stimulus is presented. It can occur within a treatment session (i.e., decreased anxiety at the end of the session) and is commonly termed as within- or intra-session habituation. In addition, it can also occur across sessions (i.e., beginning the next session at the previously decreased level) and is called between- or inter-session habituation.

Heart rate and subjective anxiety tend to be the two measures most commonly used to demonstrate habituation (e.g., Grey, Sartory, & Rachman, 1979; Grayson, Foa, & Steketee, 1982). Furthermore, a relationship appears to exist between the two factors with a tendency for them to move concomitantly, although not always at the same time. The relationship between heart rate and subjective fear has been demonstrated to follow a linear trend. This has been supported by Lang, Melamed, and Hart (1970), Sartory, Rachman, and Grey (1977), as well as Grey, Sartory, and Rachman (1979).

Grayson et al. (1982) examined the effects of attention-focusing versus

distraction when phobic stimuli were presented to obsessive-compulsives for a duration of 90 minutes. Average heart rate scores were calculated for each half hour and were found to decrease in a linear fashion for both groups, thus demonstrating within-session habituation. Subjective anxiety, as measured by subjective units of distress (SUDs) consistently decreased across time, significantly so for the group undergoing attention-focusing on the first day. This demonstrated between-session habituation. A strong relationship between heart rate and subjective anxiety was demonstrated for the attention-focus group. The decrement moved in synchrony, that is, both decreased together. This did not occur for the distraction group and at the end of treatment, a return of fear was observed in this group. From this, Grayson et al. (1982) concluded that the degree of attention can affect habituation and thus treatment outcome.

Vermilyea et al. (1984) examined the patterns of heart rate and subjective anxiety for 28 agoraphobics. Using heart rate, SUDs, and a behavioural walk, they found that there was a general improvement in functioning, but that it occurred mainly from pretreatment to mid-treatment with little change from mid- to post-treatment. This restriction in change may have been due to incomplete data. Subjects were dichotomized into synchronous and desynchronous responders. Heart rates for the synchronous group decreased significantly over treatment as compared to the desynchronous group who demonstrated some increases in heart rates. Significant decrements in subjective anxiety were also the largest and these occurred within the first half of treatment. In addition, the relationship between subjective anxiety and heart rate was examined in terms of treatment outcome. Subjects were divided into above and below normal heart

rate based on pretreatment levels. Pretreatment heart rates appeared to predict treatment responsiveness. Subjects with a high pretreatment heart rate were more likely to be treatment responders than those in the low heart rate group. This provides further evidence for the use of heart rate as a prognostic tool. In terms of synchrony, when subjects were separated according to synchrony and treatment responsiveness, five times as many non-responders appeared in the desynchronous category. However, this did not achieve statistical significance and may have been influenced by the small numbers in this category. Responders demonstrated synchronous patterns as frequently as desynchronous. Tentatively, one could suggest that synchronous decrements in anxiety responding appeared to have some predictive ability for degree of emotional processing and treatment outcome.

Craske, Sanderson, and Barlow (1987) conducted a follow-up evaluation of Vermilyea et al.'s (1984) agoraphobics. They examined the relationship between response desynchrony and heart rate throughout treatment and compared it to follow-up status on 21 of the 28 subjects. Treatment and assessment measures were the same as used by Vermilyea et al. (1984). Subjects split almost equally into the synchronous and desynchronous categories (10 and 11, respectively). The groups did not differ on average levels of heart rate, self-reported anxiety measures, and on the behavioural walk. Although low heart rate subjects were classified as desynchronous more often than high heart rate subjects, the proportions were not significantly different. There was a trend for non-responders to demonstrate low heart rate proportionately more often than high heart rate as compared to responders ($p<.07$). Self-reports of subjective anxiety demonstrated

continuing reductions for both groups from post-treatment to follow-up. Subjects with high heart rates reported significantly less avoidance than low heart rate subjects and approached significance on the behavioural walk ($p<.08$). Treatment responders at follow-up reported further reductions in fear levels, in subjective anxiety, and in the behavioural test. Since there were too few non-responders on the composite criterion, using desynchrony as a predictor for treatment outcome was not possible. However, high heart rate was deemed to be a possible predictor. Although low heart rate during exposure did not preclude treatment success, it tended to occur more frequently with desynchronous patterns and characterized non-responders more strongly.

Marshall (1985) conducted two experiments involving in vivo exposure with acrophobics to determine the effects of different exposure intervals. Responses were measured by a behavioural test, a self-report of degree of anxiety, and the use of SUDs for ten distressing situations different from that of the test situation. Groups varied in duration of exposure in Experiment 1 while in Experiment 2, total exposure time was controlled. Results from Experiment 1 indicated that brief exposure did not exacerbate but neither was it beneficial to treatment outcome. Significant effects were demonstrated when exposure was continued until anxiety was at a minimal level. Furthermore, providing positive self-statements with exposure had significant benefits for the behavioural measure and approached significance for the self-report measures. It was also in this group that a significantly higher proportion of subjects improved. Most improvement was found in the groups having a longer average duration of exposure. It was found that prolonging exposure past the level of dissipated anxiety was not

beneficial for the majority of the measures.

In Experiment 2, Brief exposure groups and a Standard exposure group were used. Results showed that the changes produced in the Brief exposure groups were inferior to those of the Standard group for all measures. While the Brief groups did not demonstrate any changes across time, the Standard group improved significantly. Furthermore, the latter also contained more subjects who had improved. Marshall (1985) suggested that after habituation occurred, additional processes took place that facilitated anxiety reduction. Once habituation had decreased the anxiety levels, subjects modified their appraisal of the situation. Thus, through the use of cognitive processes, subjects demonstrated increased benefits at follow-up.

A further investigation by Marshall (1988) provided evidence to support habituation as a prognostic tool. Degree of habituation and sensitization as measured by behavioural indices was examined in 20 acrophobics. Assessments were made at pretreatment, at post-treatment, and at 4-weeks follow-up. Since there was little change from post-treatment to follow-up, only the former was considered. Results indicated that subjects who improved significantly demonstrated a great deal of habituation both within- and between-sessions. Those who got worse, demonstrated sensitization while those who did not change due to treatment did not demonstrate habituation nor sensitization. Hence, Marshall (1988) concluded that habituation can be a predictor of treatment outcome. Furthermore, this was additional evidence supporting the idea that exposure should be continued until anxiety has subsided.

The preceding studies demonstrated positive treatment outcome when anxiety

responding was allowed to habituate to a minimal level. Furthermore, they have demonstrated the effectiveness of physiological measures, and also the use of self-report and behavioural measures as methods of measuring habituation. Perhaps results are more clear cut for simple phobics as opposed to those studies using agoraphobics and obsessive-compulsives. The complexities of the latter disorders may not demonstrate clearly the ability of the previous measures.

Criticism of the Three Systems Model

As widely accepted as the three systems model is, it is not without criticism. Hugdahl (1981) took issue on four points concerning this model. First, he felt that the model presented a definitional problem. If the same stimulus was presented to two individuals and each reacted through a different channel, then the question is whether they show the same emotional reaction expressed differently, or whether two different emotions were expressed through one behavioural system which corresponds to each emotion.

Second, Hugdahl (1981) questioned the ability to measure and quantify these components and argued that without a clear-cut definition there can be inconsistency in terms of measurement. Choosing the cognitive component as an example, Hugdahl (1981) outlined three studies which measured anxiety through different characteristics, i.e., subjective arousal, negative thoughts, and worry. Although these studies felt that cognition was being measured, can valid comparisons be made when different characteristics are examined? It was felt that the easiest and best comparisons were made in the physiological channel.

Third, Hugdahl (1981) asserted that the model has not yet gained sufficient evidence for researchers to suggest that one channel may be more involved than

another in the acquisition of a phobia. However, preliminary analysis from his own research may present some evidence that this model can play a role in explaining the etiology of phobias.

Lastly, the utility of the model lies in its ability to facilitate therapists in choosing the best therapy for the presenting problem. However, Hugdahl (1981) stated that seldom does a person load exclusively on one component, therefore, the optimal treatment for phobias is one in which specific needs of the client are met, in conjunction with an exposure-based response prevention component.

In summary, Hugdahl (1981) has stated important concerns which may prompt further investigation. If indeed it is the case that the three systems model has been accepted too easily, then more research need to be conducted as there does not appear to be many investigations addressing these methodological concerns.

Immediate background of the present study:

Studies evaluating exposure methods, e.g., flooding, imaginal, in vivo and modelling, have utilized physiological, behavioural, and self-rating measures to monitor changes in emotional processing. While it is not claimed that self-ratings of physiological and behavioral experiences are isomorphic with overt measures, it is nevertheless likely that self-ratings of these dimensions can be used as indicators of client awareness. It would follow that sensitizing the client to his/her responses would be of benefit to therapy outcome in that the client would become more analytical of the different dimensions of their fear. Rather than having the fear perceived as a whole unmanageable dilemma, self-ratings allow identification of the anxiety components and the client is then better able to partition the fear into smaller, workable elements. A study by Liddell, Bilsbury, and Rattenbury (1987)

examined the concordance/discordance in self-ratings of the three components of fear during an exposure-based treatment program with an agoraphobic. It was found that prior to treatment, responses to highly feared stimuli as ranked on an anxiety hierarchy were concordant. This is to say, the three response channels were of relatively equal strength at a high level of arousal. However, as treatment progressed, desynchrony among the components was observed for items immediately following a successfully completed exposure. At the end of treatment and at six month follow-up, responses were again concordant but at a lower level of arousal.

An important element of the Liddell et al. (1987) study was the compression of the program into four weeks of daily exposure assignments. It is possible that the amount of elapsed time between exposure sessions has an influence on the effectiveness of the therapy. Inter-trial interval has been examined very closely within the animal learning field but little conclusive evidence has been obtained from studies examining the effects of inter-session interval (ISI) on psychotherapy (Foa, Jameson, Turner, and Paynes, 1980). Orlinsky and Howard (1978) reviewed 16 studies which examined the effects of ISI on psychotherapy. Based on these studies, they concluded that the association between the two variables was somewhat ambiguous.

A few studies whose results suggested that ISI did not play a significant role in desensitization were examined by Foa et al. (1980). They noted that, in the reviewed studies, the length of sessions, the number of sessions and the ISI were varied together, thus causing a confound. In view of this, Foa et al. (1980) studied the effects of ISI by keeping the length and number of sessions constant.

In contrast, to the reviewed studies, Foa et al. (1980) observed differential effects when massed versus spaced in vivo exposure sessions were employed with 11 agoraphobics. One group received 10 daily sessions (massed) of in vivo exposure while the second group received 10 weekly sessions (spaced) of similar exposure. At the completion of the series of treatments, patients received no treatment for one week and were re-evaluated after which time treatment schedules were crossed over for the two groups. An evaluation was conducted one week after the termination of the second treatment series. Results showed that while both series of exposure decreased avoidance and anxiety, massed practice generated more improvement than spaced practice regardless of its position in presentation. Foa et al. (1980) suggested that this improvement was probably due to a lack of opportunity to engage in avoidant behaviour.

Present study:

Since a number of studies consider habituation likely to be a mechanism involved in emotional processing, it follows that by creating conditions in which habituation is facilitated, therapy outcome should be enhanced. This investigation proposes to study the effects of massed practice, as opposed to spaced practice, through habituation with individuals presenting with dental anxiety while observing these effects in the three channels of anxiety responding. It is hypothesized that a program under massed practice will be superior to one using spaced practice and its effects will be shown in self-ratings of the three systems of anxiety responding. Furthermore, it is hypothesized that these effects will be demonstrated by a distinct pattern of change. More specifically, concordance between the three channels will be seen prior to treatment (high level

of anxiety), and again at the end of treatment (low level of anxiety). During the course of treatment, discordance should be observed at points on the hierarchy where the patient has not yet been successfully exposed to the feared stimulus.

Method

Two main hypotheses were tested in this study. The first hypothesis was that a treatment programme consisting of massed sessions would be superior to one utilizing spaced sessions. Secondly, the effects of the treatment would be demonstrated by the formation of a predictable pattern between the channels of responding occurring at the beginning and at the end of treatment. This pattern would be similar to one found by Liddell, Bilsbury, and Rattenbury (1987) in a single case study. The present study aimed to replicate their finding with a group of dental phobics. It was expected to find discordant responding between the three response modes prior to exposure, and concordance after exposure.

To test these hypotheses, a behavioural treatment programme based on imaginal exposure and anxiety management techniques was conducted using a sample of dental phobics randomly assigned to a "massed" or "spaced" condition. The anxiety management techniques included progressive muscle relaxation, information concerning the detrimental effects of both pain anticipation, and tension on pain. Identical treatment was administered to both groups, except for the interval between sessions. The comparison of the two groups was viewed as a 2 (massed vs spaced) x 7(pretreatment to six month follow-up) design with repeated measures over time.

Subjects

Subjects were obtained by an advertisement (see Appendix A) which was placed in local newspapers, posted throughout the city, and announced on local radio stations. Eighteen subjects were obtained and allocated to one of two treatment conditions by random assignment with the exception of two subjects who had to be arbitrarily placed in the spaced group in order to have comparable sized groups.

The criterion for measuring dental anxiety was a score of 15 or above, from a possible 20, on the Corah Dental Anxiety Scale (DAS) (Corah, 1969; Appendix B). This level was chosen based on extensive clinical experience by Corah, Gale, and Illig (1978) who found that a score of 15 was an indication of disproportionate dental anxiety. A further description of the scale follows in Subjective Measures (p. 21).

Therapists

Two therapists were involved in the treatment programme. One was responsible for all the initial interviews and follow-up sessions, while responsibility for programme implementation was shared by both.

Procedure

Initial individual interviews were arranged and conducted at the Memorial University of Newfoundland Psychology Clinic for the 18 respondents. Interviews were based on a structured format for assessing dental fear (Vrana, McNeil, and McGlynn, 1986; Appendix C).

Measures

Outcome was evaluated by five measures. These were based on three types of subjective self-reports as well as two objective behavioural reports.

A. Subjective measures

1) Dental Anxiety. The Corah DAS was chosen to measure dental anxiety because of its easy administration and demonstrated reliability and validity. The Corah DAS is a self-report questionnaire consisting of four questions regarding feelings when faced with four discrete dental situations. All subjects were administered the DAS at pretreatment, at the end of treatment, immediately following their dental visit, at a follow-up approximately one week after the dental visit (Follow-up 1), and again, six months later (Follow-up 2).

2) General Anxiety. The Symptom Questionnaire (Lehrer and Woolfolk, 1982; Appendix D) was used as a control for general anxiety responses. The questionnaire is comprised of 36 questions encompassing the behavioural, cognitive, and physiological components of anxiety responding. It was administered at pretreatment, at the end of treatment, and six months later (Follow-up 2).

3) Concordance/Discordance. Measurement of changes within the three channels of responding were obtained for the duration of the programme. These measures were subjective responses to dental situations based on making an appointment and the four situations depicted in the Corah DAS (Corah, 1969; Appendix E). The responses were quantified through the use of Discan which is an acronym for Discretized Analog (Singh and Bilsbury, 1984a, 1984b, 1986). Discan is a family of methods used to measure subjective variables on a

continuum, for example, fear. The continuum is partitioned into approximately 10-14 levels and have been shown to have a low measurement error from a few initial reference levels. The latter are descriptions of typical responses ranging from minimum to maximum and can be worded to meet the specific needs of the client. The client is required to relate his/her actual perceived level to no more than two in the set of reference levels. A reliability check is provided through the internal consistency of the component judgements. For a more detailed explanation, the reader is directed to the technical manual (Singh and Bilsbury, 1986). The Discans were presented at pretreatment, at each of the four treatment sessions, and at the two follow-up sessions.

Discan administration. Each Discan administration comprised the circulation of 15 binders (5 situations x 3 fear components) to the group members who individually completed their Discan ratings on separate sheets. The 15 binders were distributed equally between the subjects who circulated them among themselves after completing their own ratings. The random sequence for the paired comparisons and the presentation of the binders were changed for each treatment session.

The method of Discan administration was by Estimation Method RCS-B, Power Two with four levels of reference. The reference levels consisted of statements describing points along a continuum of anxiety. This method was chosen as it allowed a random presentation of comparisons while obtaining overlapping information which helped to determine consistency of responding. Furthermore, the randomization controlled for order effects of presentation.

Each binder was comprised of ten pieces of paper (9.25 in. x 6.5 in.) which

decreased in width (.5 in.) as one progressed through the binder. Three plastic card holders (3 in. x 2 in.) were pasted on each page. Reference levels were printed on cards which slipped into the plastic holders, thereby facilitating random presentation. Following these 10 pages was a response form (Appendix F) which was divided into 10 sections corresponding to the decreasing size of the reference level pages. Only one level for each reference page was marked in a section. An instruction page was placed under the response sheet which described the procedure of recording responses. In addition, a statement of the subject's expectation toward a specific dental situation was printed below the instructions. Responses were made on the basis of the statement of expectation.

When a binder was finished, the subject tore out the response sheet and passed the binder on to the next subject. All response sheets were handed to the therapist who then transferred the responses to a Discan Check Form (Appendix G), thereby obtaining a quantifiable estimate of the individual's subjective state.

B. Behavioural measures

The first objective measure was the subject's ability to make a dental appointment within the specified time of the treatment programme. It was believed that by doing this subjects would learn to gain control in anxiety responding by using the physiological and cognitive coping techniques. It was expected that increased control would increase approach behaviour.

A second measure was a proof of attendance form (Appendix H) which was completed by the dentist. Subjects were given the choice of using this form or providing a photocopy of their receipt.

Treatment Programme

A treatment programme found to be effective with dentally phobic clients was used in this study (Blackwood, 1986). The program was based on the teaching of anxiety management techniques in conjunction with imaginal exposure. Blackwood (1986) found that discussing anticipatory anxiety led to decreases in pain anticipation at the end of treatment. In view of this, this study placed emphasis on dealing with anticipatory anxiety because it is a general problem and Blackwood (1986) found dealing with pain anticipation to be as good as distraction.

A combination of methods was used in the present study to teach clients to control their anxiety. Progressive muscle relaxation techniques (Bornstein and Borkovec, 1973) were taught initially, followed by an explanation of the three systems model (Lang, 1977). An educational component informing clients about the composite nature of anxiety was discussed, succeeded by imaginal exposure sessions.

Programme Treatment Plan:

The treatment programme consisted of four treatment sessions. The massed group received two treatment sessions a week for two weeks. The spaced group received one treatment session a week over a four week duration. The treatment program was identical for both groups. (For each session plan, see Appendix I).

Session 1: Clients were introduced to the rationale of the treatment programme. The relationship between anxiety and the physiological responses each subject experienced was explored and relaxation techniques were introduced as a means of controlling these responses. Progressive muscle relaxation of the 17

muscle groups (Bernstein and Borkovec, 1973) was demonstrated and a written summary was given to each subject to facilitate homework assignments (Appendix J). In addition, information pertaining to the role of anticipatory pain in dental anxiety was introduced, as was the expectation of making a dental appointment during the program. The Discans (Singh and Bilsbury, 1984a) were administered at the end of each session.

Homework assignments were to be practiced at least three times between sessions. Times of practice were monitored on diary sheets and any extra practice sessions noted. Clients were asked to practice the relaxation technique and think about the anticipatory pain information.

Session 2: Homework and relaxation were reviewed and discussed. The role of cognitions was discussed in terms of each subjects' self-statements of anticipating anxiety and negative consequences. Suggestions were given to help put these thoughts into a more realistic framework. Imaginal exposure was introduced through the first of the five dental situations (Appendix K). Exposure and relaxation were alternated at 2 minute intervals in order to give the client opportunity to evoke anxiety and use the relaxation and cognitive strategies as coping mechanisms. Homework consisted of self-exposure to the dental situation with relaxation.

Session 3: Review of homework was followed by imaginal exposure using the second and third dental situations (Appendix K). Again, exposure was alternated with the relaxation on a 2 minute schedule. Scheduled appointments were noted and subjects were informed of the verification process.

Session 4: The fourth and fifth dental situations were introduced into imaginal

exposure following homework review (Appendix K). Subjects were administered all treatment outcome measures. Follow-up appointments were scheduled to be attended within a week after the dental visit. Subjects were given a DAS to complete immediately after the dental appointment to be returned at the first follow-up session.

Follow-up Sessions

Outcome was evaluated at two points after programme completion: (a) one week after each client's dental appointment, and (b) six months after their first follow-up session.

Follow-up 1: one week post-dentist

Within approximately one week after having attended the dental appointment, each client returned to the Clinic with the DAS completed immediately after the dental visit. The DAS and the Discans were completed in this session.

Follow-up 2: six months post-dentist

After approximately a six month interval from Follow-up 1, each client was contacted to arrange a second follow-up appointment. At this session, all outcome measures were repeated. In addition, the number of visits and type of treatment each client received during the interval was also obtained.

Results

Subject Characteristics

Completers versus non-completers

Eighteen individuals responded to the programme advertisement. The respondents were comprised of fourteen females and four males. Of the eighteen, twelve subjects completed treatment; nine females and three males. Completers and noncompleters were compared on the following variables: demographic variables of sex, age, education, and marital status; dental history included years since last dental visit, years of dental avoidance, family history of dental anxiety, and previous treatment for dental anxiety; pretreatment measures included the DAS, the Symptom Questionnaire, and the Discans. Raw data for the completers can be found in Appendix L. A series of t-tests were performed on age, education, years of dental avoidance, last dental visit, and all pretreatment measures (Appendix M). With the exception of the last dental situation in the cognitive Discan ($t=2.12$, $df=16$, $p=.05$), there were no significant differences. The one exception indicated that the subjects who eventually dropped from the programme tended to respond more strongly to the highest anxiety-provoking statements. Fisher's exact probabilities were not significant for sex, marital status, avoidance due to fear, avoidance of dental topics, and negative childhood dental experiences (Appendix N). Therefore, subjects did not appear to be significantly different on variables on which they were compared prior to the

treatment programme.

Study sample

The study sample were comprised of the nine females and three males who completed treatment. Demographic characteristics and dental history for the treatment completers are outlined in Table 1 (p. 30) and Table 2 (p. 31), respectively. Their mean pretreatment data, based on the Corah DAS (Corah, 1969), the Symptom Questionnaire (Lehrer and Woolfolk, 1982) are found in Table 3 (p. 32) while the mean pretreatment Discans (Singh and Bilsbury, 1984a, 1984b) are described in Table 4 (p. 33).

Subjective self-report measures

All scores were submitted to a time (time of measurement) x group (spaced, massed) multivariate analysis of variance (MANOVA). This type of analysis relied on difference scores which were calculated between pretreatment and the specified times of measurement for each measure and were submitted to a MANOVA. This specific type of analysis was developed by O'Brien and Kaiser (1985) as it alleviates some common problems found in using MANOVAs with repeated measures.

Dental Anxiety

Corah DAS. Difference scores were obtained for the five times of measurements: pretreatment, end of treatment, immediately following the dental visit, one week follow-up, and six month follow-up. A statistically significant main effect was found for time, $F(4,7) = 67.60$, $p < .01$. The decrease in mean DAS scores for the two groups from pretreatment to six month follow-up is

Table 1

Summary of demographic characteristics for the treatment completers

Demographic Characteristics		Spaced (n = 6)	Massed (n = 6)	Total (n = 12)
1)	Sex	Female = 5 Male = 1	Female = 4 Male = 2	Female = 9 Male = 3
2)	Age	M = 35.00 SD = 10.20 Range = 22-48	M = 36.83 SD = 14.15 Range = 20-56	M = 35.92 SD = 11.80 Range = 20-56
3)	Education	< H.S. = 1 Post-secondary = 5	< H.S. = 1 Post-secondary = 5	< H.S. = 2 Post-secondary = 10
4)	Marital status	single = 3 married = 3	single = 4 married = 2	single = 7 married = 5

Table 2

Summary of the dental history for the treatment completers

	Dental History	Spaced (n = 6)	Massed (n = 6)	Total (n = 12)
1)	Years since last dental visit	M = 8.17 SD = 11.16 Range = 1-30	M = 8.42 SD = 7.55 Range = 1-21	M = 8.29 SD = 9.08 Range = 1-30
2)	Years of dental avoidance	M = 8.67 SD = 10.76 Range = 2-30	M = 8.42 SD = 7.66 Range = 0-21	M = 8.29 SD = 9.08 Range = 0-30
3)	Family history of dental anxiety	Yes = 2 No = 4	Yes = 2 No = 4	Yes = 4 No = 8
4)	Previous treatment for dental anxiety	Yes = 1 No = 5	Yes = 0 No = 6	Yes = 1 No = 11
5)	Negative childhood dental experiences	Yes = 6 No = 6	Yes = 4 No = 2	Yes = 10 No = 2

Table 3

Mean pretreatment Dental Anxiety Scale (DAS) and Symptom Questionnaire (SQ) scores for the treatment completers.

Group	DAS Scores
Spaced	
M	17.70
SD	1.57
Massed	
M	17.50
SD	1.69

	SQ Scores			
Group	Total	Physiological	Cognitive	Behavioural
Spaced				
M	2.71	2.24	3.57	2.48
SD	1.16	.99	1.78	1.22
Massed				
M	2.56	1.81	3.69	2.51
SD	1.10	1.34	1.20	1.23

Table 4

Mean pretreatment Discan scores for the treatment completers

	Dental Situation				
Group	1	2	3	4	5
			Behavioural		
Spaced					
M	7.30	5.30	4.30	4.70	3.80
SD	5.96	4.55	4.50	5.44	4.80
Massed					
M	5.63	3.75	3.00	3.88	3.38
SD	4.47	4.43	2.20	2.48	2.83
			Cognitive		
Spaced					
M	10.30	11.00	12.40	12.50	13.00
SD	2.98	2.75	1.65	1.72	.94
Massed					
M	11.38	11.63	11.75	12.50	12.63
SD	2.39	2.13	2.32	1.93	1.69
			Physiological		
Spaced					
M	8.90	7.90	9.40	10.50	10.00
SD	3.32	3.60	2.55	2.46	2.67
Massed					
M	8.25	10.50	9.25	11.50	10.88
SD	3.50	3.42	3.66	2.14	2.42

illustrated in Figure 1 (p. 35). The multivariate main effect for group was not statistically significant.

General Anxiety: Symptom Questionnaire

The mean scores obtained by the programme completers for the physiological ($\underline{M}$ = 2.68, SD = .83), cognitive ($\underline{M}$ = 3.44, SD = 1.23), and behavioural ($\underline{M}$ = 2.65, SD = 1.10) components were similar to those of the nonpsychiatric sample used by Lehrer and Woolfolk (1982): physiological ($\underline{M}$ = 2.31, SD = 1.22, cognitive ($\underline{M}$ = 3.62, SD = 1.50), and behavioural ($\underline{M}$ = 2.71, SD = 1.40). A t-test indicated that this study sample did not score higher in anxiety than the general population ($p>.05$).

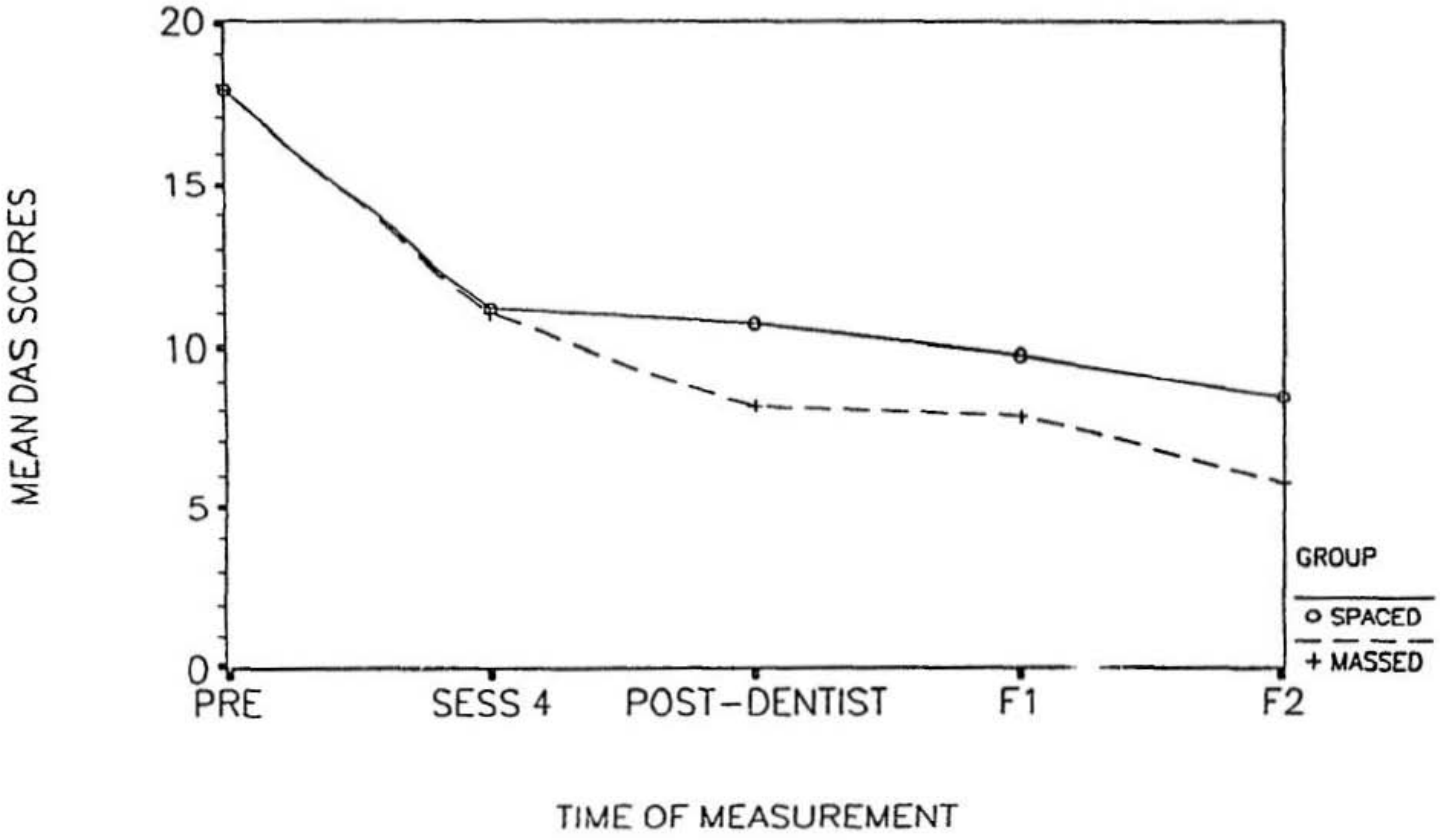
Treatment effects. Over time, there was a significant multivariate time effect, $\underline{F}(3,8) = 5.36$, $p<.05$, for all subjects, showing a notable decline in general anxiety from pretreatment to six month follow-up. Univariate F-tests showed that the physiological component contributed most heavily to this result, $\underline{F}(1,10) = 14.10$, $p<.01$.

The three subscales of behavioural, cognitive, and physiological responding were submitted to a MANOVA to test for differences between scores obtained at pretreatment, end of treatment (Session 4), and six month follow-up. Group means were calculated for each response channel for each evaluation period. Difference scores were submitted to a MANOVA. For the first comparison, pretreatment versus Session 4, there were no significant multivariate group effects. There was no significant time effect for this comparison.

A MANOVA conducted on pretreatment versus six month follow-up elicited a nonsignificant group effect. Univariate F-tests showed that while the behavioural

Figure 1. Distribution of mean Dental Anxiety Scale (DAS) scores from pretreatment to six-month follow-up.

F1 = 1 week follow-up; F2 = 6 month follow-up



responses for the massed group appeared to decrease more than those of the spaced group, it just fell short of significance, $F(1,10) = 3.66$, $p<.08$.

Concordance

In the literature, concordance has been used as a term to describe the relationship between measurements of the three channels of responding. Notably, the physiological channel has usually been measured overtly through electrophysiological equipment. Although this type of equipment was not employed in this study, the term concordance was used to reflect the relationship between the self-report measures involving the three response channels.

Since concordance would imply that scores on all three channels of responding are correlated, differences between the channels would give a degree of discordance. Difference scores were obtained by subtracting each channel from one another per dental situation and the absolute values were summated to give a concordance score for that situation. For example, the absolute values for behavioural minus cognitive, behavioural minus physiological, and cognitive minus physiological were summed to equal one concordance value for one situation during one measurement interval.

Concordance scores were calculated for the spaced and massed groups and were submitted to a 2 (group) by 5 (situation) by 7 (time) MANOVA. There was no statistically significant main effect for group, nor any significant interactions between group by time and group by situation. There was a significant within subjects time effect, $F(6,54) = 7.70$, $p<.01$, indicating that there was a difference in concordance from pretreatment to six month follow-up for all subjects (Figure 2, p. 38). Time by situation was not significant indicating that the concordance

scores between any given session were not significantly different for any of the five dental situations. In addition, there was a significant situation effect, $\underline{F}(4,36) = 10.36$, $\underline{p}<.01$, indicating a difference in concordance scores on the different situations. This would be expected due to the increasing severity of the dental situations.

Exposure comparisons

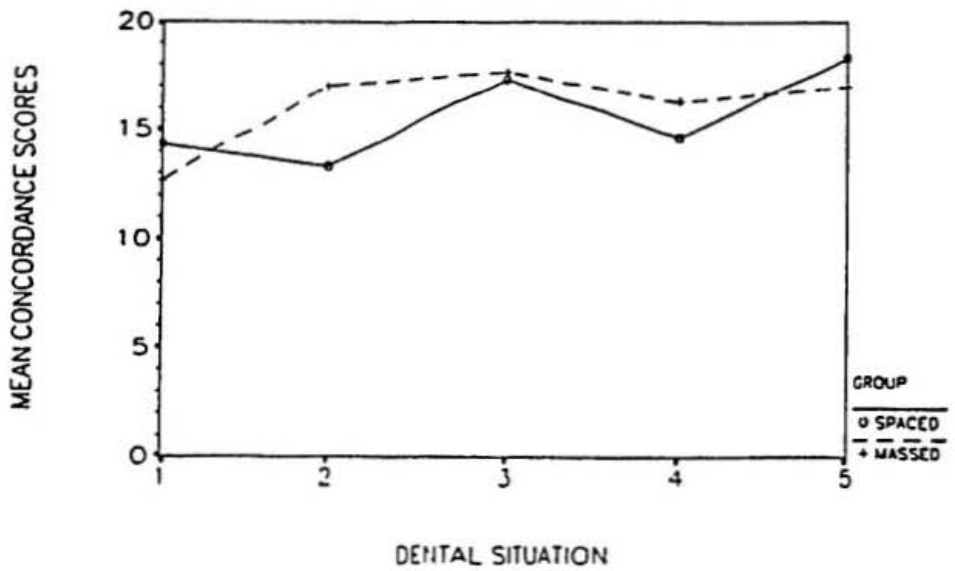
Pre- and post-exposure scores were submitted to a MANOVA. There was a significant group difference, $\underline{F}(2,9) = 4.33$, $\underline{p}<.05$. From univariate analysis, the significance was demonstrated between sessions 1 and 2, that is, after exposure to situation 1 and prior to situation 2. There were no significant differences between pre- and post-exposure over time, contrary to expectations.

Practice between sessions

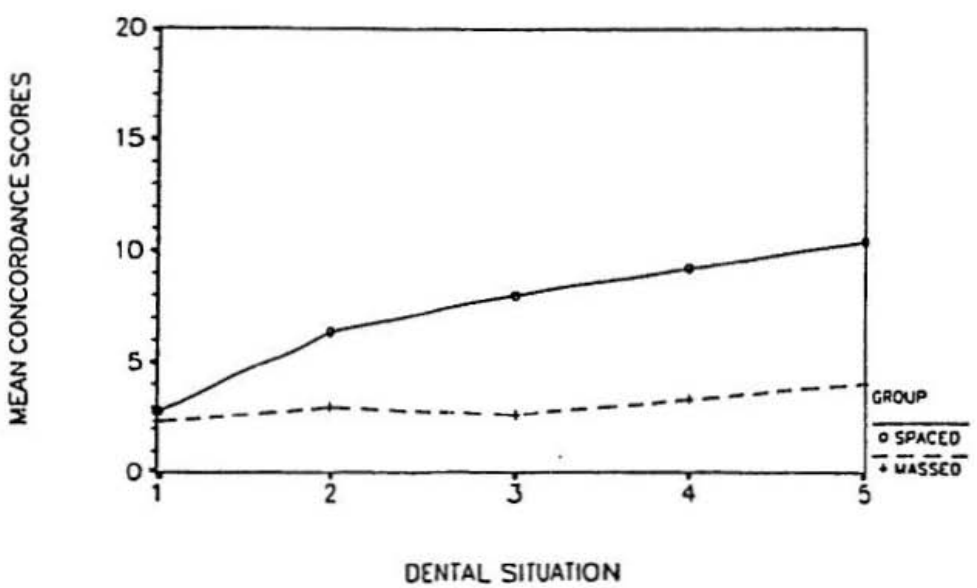
Imaginal exposure and relaxation were to be practiced at least three times between treatment sessions. Practice between treatment sessions 1 and 2 was considered Practice 1; between treatment sessions 2 and 3 was Practice 2; and between treatment sessions 3 and 4 was Practice 3. The number of practice sessions was self-reported and recorded on monitor sheets. These monitor sheets were quantified and submitted to a series of t-tests. There were no significant differences between the groups in terms of the number of practice sessions. The t-test values were: Practice 1 = 1.34, df = 10, n.s.; Practice 2 = .19, df = 10, n.s.; and Practice 3 = .32, df = 10, n.s. Therefore, neither group had significantly more practice at exposure and relaxation.

Figure 2. Distribution of mean concordance scores for all dental situations at: (a) pretreatment; (b) six month follow-up

(a)



(b)



Discussion

Two-thirds of the advertisement responders completed the treatment programme. All subjects improved to the degree that they were able to attend dental treatments with much less anxiety as indicated by the self-report and behavioural measures. Although the results were in the predicted direction, they did not reach statistical significance. The dentally anxious subjects who participated in this study were not significantly different from those who did not complete the programme, with the exception of the scores on the last dental situation of the cognitive Discan. This difference might be attributed to the possibility that the noncompleters held stronger beliefs regarding the strength of their fear and doubts that treatment would be beneficial. In contrast, the completers may have viewed their fear as more circumscribed and were not unduly anxious in other areas of their life.

Hypothesis 1

The first hypothesis stated that massed treatment would be superior to the spaced treatment programme. In spite of the treatment programme appearing efficacious for both the spaced and massed exposure groups, there was insufficient evidence to indicate any superiority of massed exposure sessions over spaced exposure sessions, hence, the first hypothesis was not supported. Although not achieving statistical significance, the massed group was consistently below the spaced group in anxiety responding, as measured by the DAS and the Symptom

Questionnaire throughout treatment. Similarly, on the concordance measure, the massed group showed less discrepancies between the response channels than the spaced group from Session 3 to six month follow-up. Furthermore, regression toward the mean could be considered an alternate explanation for the anxiety reduction since the subjects were chosen for their extreme scores.

To help understand the results of this study, it was compared to one conducted by Foa et al. (1980) in which significant group effects were found in a sample of agoraphobics. First, the cross-over design used by Foa et al. (1980) is stronger in that all subjects received both treatments. In support of the present study, a long term follow-up of six months was conducted allowing the opportunity to examine if there was evidence of "lag" in any of the response channels. No long term follow-up was conducted in the Foa et al. (1980) study. It appeared that in the present study the subjects' cognitions were slower to change than either the physiological or the behavioural channels. Furthermore, outcome measurements were based on two objective behavioural measures as well as two subjective self-reports of the three channels as opposed to one independent assessor using Likert-type scales (Foa et al., 1980).

Second, practice of exposure sessions with relaxation was encouraged between treatment sessions for the present study. Subjects in Foa et al.'s (1980) study were not expected to participate in homework assignments. One would expect stronger results in a group having had practice in exposure. Since Foa et al.'s (1980) study obtained significant group effects and the present study did not, this discrepancy might possibly be explained by the difference in the number and duration of sessions administered. The present study consisted of four treatment

sessions in which actual therapy comprised, on average, ninety minutes as compared to ten treatment sessions, each averaging two hours. It was felt, based on previous research, that the number of sessions selected was sufficient time in which to present the pertinent information and techniques without the sessions becoming redundant. Furthermore, Foa and Kozak (1986) suggested that since agoraphobia is more pervasive, it appeared that a longer exposure time is needed to achieve habituation, whereas specific phobics require substantially less time to habituate.

Foa et al. (1980) noted that spaced sessions may allow for accidental exposures to feared stimuli, thus increasing the likelihood of spontaneous recovery of anxiety-avoidance responses which can lead to interference of newly learned corrective information. Hence, they attributed their superior results of massed exposure not to the amount of exposure, but rather to the lack of opportunity to engage in avoidance or escape responses. For the most part, dental visits are yearly or twice yearly events. Because of the infrequent attendance there is a lack of opportunity to experience in vivo exposure on a regular basis. Associated with this is that many dental phobics do not visit the dentist until they can no longer stand the pain. Because of this, dental visits become associated with pain, thus they do not have the opportunity to become associated with non-aversive procedures.

Hypothesis 2

The second hypothesis was that concordance between the three channels of anxiety responding would demonstrate a distinct pattern of change. Although there were no significant differences between groups, all subjects responded more

concordantly as the programme progressed, however, it appeared that the massed group maintained a slight lead over the spaced group. This could best be explained by habituation. Research was previously presented which illustrated how habituation is linked with positive treatment outcome. It provides the setting for the learning of new information and self-control, thus maximizing the benefits of therapy (Marshall, 1985). Since home practice had to be conducted in a shorter period of time between treatment sessions, it is more likely that "dental thoughts" became more salient, facilitating fear processing. Unfortunately, this difference was not maintained at either follow-up. It seemed as if the spaced exposure group needed the extra time between Session 4 and follow-up to attain the same level of habituation evidenced in the massed group.

The discordance that is present may be explained by examining the behavioural channel. A few of the subjects were attending dental visits regularly but were experiencing a great deal of physiological and cognitive anxiety prior to and during the visit. Therefore, discordance may have been evident since emotional processing had been initiated but never successfully completed. Some of Rachman's (1980) symptomatology were reported by subjects in the initial interview. The most common complaints were subjective distress, unpleasant and intrusive thoughts, disturbing dreams, and the return of fear.

Demographic variables and scores on the Symptom Questionnaire indicated that the study sample was well-educated and in terms of psychological adjustment, were similar to the non-psychiatric sample used by Lehrer and Woolfolk (1982). Since undue anxiety was an unlikely cause for the phobia, it is likely that for these subjects, dental anxiety was a learned fear. From the

structured interview, it was found that 83% of the subjects related negative childhood experiences with the dentist. When subjects were asked what bothered them in the dentist's office, the majority tended to generalize their fear to everything in the office. In addition, some were unable to listen to conversations or watch movies if dentally-related topics were introduced. In contrast, when asked to rate specific dental situations on a scale of 1 to 10, many were able to give differentiation between situations. It is probable that the negative experiences associated with the dentist had influenced their perceptions and for some, it had generalized to stimuli outside the dental office (e.g., sound of power tools).

Emotional Processing

It appears that all the subjects emotionally processed their dental fear to a satisfactory degree, that is, enough to go to the dentist and maintain regular dental visits six months after treatment. Rachman's (1980) use of test probes was repeatedly met with success in this study. In general, the subjects were not uncomfortable when reviewing their previous dental visits. A few subjects discussed procedures which would occur in future appointments with little concern.

The imaginal exposure narratives attempted to evoke anxiety responding in all three response channels. Subjects were asked to "make it as real as you can". This was suggested by Lang (1977) as a way of activating propositional structures, thereby increasing the probability of success in emotional processing.

Finally, the three indicant of emotional processing proposed by Foa and Kozak (1986) were achieved to varying degrees as indicated by self-report measures and

experimenter observation. Unfortunately, physiological measures, other than self-report questionnaires were not obtained. However, since increased respirations and hand clenching were observed to occur, these were taken as evidence of fear activation. Within session habituation was evaluated only in terms of the subjects' verbal self-report that they felt more relaxed at the end of the treatment session. Because of time restraints and the undesirability of using the same measure at the beginning and at the end of the same session, the Discans were administered only at the end of the session. It might have been more beneficial to use an additional, more easily administered measure like subjective units of distress (SUDs) to monitor within session habituation. Between session habituation was achieved as measured by both the concordance scores and the raw scores of the Discans.

In conclusion, additional factors need to be addressed which may present some advantage to using a massed practice program in spite of the findings. It is possible that a shorter program would provide encouragement to clients as they attained each subgoal. This in turn may lead to increased commitment and decreased attrition rates. Although these conclusions are not empirically based, the increased likelihood of return visits following positive consequences is an underlying tenet of learning behaviour.

Future Directions

In summary, although this study did not achieve the level of statistical significance that was hoped for, it was useful as an originating point for further investigations. The next step would be a replication with a larger sample in order to determine if the differences between groups could be enhanced thus leading to

significant between group differences. If significant results were obtained, then one could analyze the individual components of the program to determine which part exerted the most influence. On the other hand, if replication failed to provide significant results, the benefits of time and economics alone would support the use of the massed procedure. Further investigation could be conducted to examine emotional processing in other types of monophobics to determine if differences exist between the type of phobia and the one responds to it.

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Appendix A

ADVERTISEMENT

AFRAID OF GOING TO THE DENTIST?

Does your fear stop you from visiting the dentist regularly? Do you feel uncomfortably anxious when you do go? If so,

a program directed at reducing DENTAL ANXIETY in ADULTS will be offered under the supervision of Members of the Clinical Faculty of MUN's Psychology Dept.

If interested call 737-4387 between 9-12 (Mon-Fri) for more information and to arrange an appointment.

Appendix B

Corah Dental Anxiety Scale

Instructions: For each of the questions below please choose one statement which is most like your feeling or behaviour. Indicate your choice by placing an (X) in the space provided.

1) If you had to go to the dentist tomorrow, how would you feel about it?

(a) I would look forward to it as a reasonable experience (...)
(b) I wouldn't care one way or the other (...)
(c) I would be a little uneasy about it (...)
(d) I would be afraid that it would be unpleasant and painful (...)
(e) I would be very frightened of what the dentist might do (...)

2) When you are waiting in the dentist's office for your turn in the chair, how do you feel?

(a) Relaxed (...)
(b) A little uneasy (...)
(c) Tense (...)
(d) Anxious (...)
(e) So anxious that I sometimes break out in a sweat or almost feel physically sick (...)

3) When you are in the dentist's chair waiting while he gets his drill ready to begin working on your teeth, how do you feel?

(a) Relaxed (...)
(b) A little uneasy (...)
(c) Tense (...)
(d) Anxious (...)
(e) So anxious that I sometimes break out in a sweat or almost feel physically sick (...)

4) You are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments which he will use to scrape your teeth around the gums, how do you feel?

(a) Relaxed (...)

(b) A little uneasy (...)
(c) Tense (...)
(d) Anxious (...)
(e) So anxious that I sometimes break out in a sweat or almost feel physically sick (...)

Appendix C

Dental Fear Interview

1) What is going to the dentist like for you? How does it feel?

2) How long since you last saw a dentist?

___ 6 months or less
___ 6 months - 1 year
___ 1-2 years
___ 2-5 years
___ 5-10 years
___ over 10 years
___ never been to a dentist

For what reason did you see the dentist the last time?

3) Over the past 2-3 years, approximately how often have you been to the dentist? (Check one)

___ every 6 months
___ once a year
___ once every 2 years
___ less than once in 2 years

4) Have you avoided going to the dentist in the past because of fear or anxiety?

___ yes ___ maybe ___ no

- If yes or maybe, how long did you delay? (approx. yrs., months)

- What finally happened?

- Can you describe specific things that bothered you? (e.g., drilling sounds, smells, etc.)

- Are there instances in which you have avoided listening to movies or reading stories about dental topics?

- Do you presently need to see a dentist?
___ yes ___ no If yes, why?

5) I'd like to know how comfortable or uncomfortable you would feel in each of the following situations. Please

rate these on a 1-10 scale.

1 = very uncomfortable 10 = very comfortable

___ telephone for a dental appointment
___ having your teeth probed and otherwise examined by a dentist
___ having a dentist criticize the condition of your teeth

___ asking the dentist to be more careful because of pain you experienced during your last visit

___ an injection in your mouth before dental work

___ drilling of a tooth and filling a cavity

___ having a tooth pulled

___ being a patient in a dental chair and having a procedure demonstrated in your mouth in front of a crowd of dental personnel

6) Are there other dental situations that would cause you to feel uncomfortable or that you would want to avoid?

7) How intense are your concerns about going to the dentist as you compare them to other fears of frightening experiences you might have had?

1 = relatively not intense at all 10 = extremely anxiety provoking

8) How confident are you that, at present, you could go to a dentist for a cleaning, examination and possible dental work?

1 = very unsure 10 = very confident

9) If you found out about a treatment program designed to help people cope with anxiety or fear associated with dental visits, how interested would you be in participating?

1 = not interested 10 = very interested

10) Do you have any other comments or impressions about your experience with dental care? (e.g., childhood experiences.)

11) Are there any other members in your family who seem to be dentally anxious?

12) Have you ever sought treatment for dental anxiety before now? (If yes, with whom?)

Appendix D

SYMPTOM QUESTIONNAIRE

NAME: _____

AGE: _____ SEX: M F DATE: _____

OCCUPATION: _____ MARITAL STATUS: S M D Sep W

EXAMPLE

Circle the number that indicates how you feel for each item. For example, if you feel happy often, but not all the time put:

I feel happy 0 1 2 3 4 5 6 7 8
Never Extremely Often

---

1. My throat gets dry.
   0 1 2 3 4 5 6 7 8
   Never Extremely Often

2. I have difficulty in swallowing.
   0 1 2 3 4 5 6 7 8
   Never Extremely Often

3. I try to avoid starting conversations.
   0 1 2 3 4 5 6 7 8
   Never Extremely Often

4. My heart pounds.
   0 1 2 3 4 5 6 7 8
   Never Extremely Often

5. I picture some future misfortune.
   0 1 2 3 4 5 6 7 8
   Never Extremely Often

6. I avoid talking to people in authority (my boss, policemen).
   0 1 2 3 4 5 6 7 8
   Never Extremely Often

7. My limbs tremble.
   0 1 2 3 4 5 6 7 8
   Never Extremely Often

8. I can't get some thought out of my mind.
   0 1 2 3 4 5 6 7 8
   Never Extremely Often

9. I avoid going into a room by myself where people are already gathered and talking.
   0 1 2 3 4 5 6 7 8
   Never Extremely Often

10. My stomach hurts.
0 1 2 3 4 5 6 7 8
Never Extremely Often

11. I dwell on mistakes that I made.
0 1 2 3 4 5 6 7 8
Never Extremely Often

12. I avoid new or unfamiliar situations.
0 1 2 3 4 5 6 7 8
Never Extremely Often

13. My neck feels tight.
0 1 2 3 4 5 6 7 8
Never Extremely Often

14. I feel dizzy.
0 1 2 3 4 5 6 7 8
Never Extremely Often

15. I think about possible misfortunes to my loved ones.
0 1 2 3 4 5 6 7 8
Never Extremely Often

16. I cannot concentrate at a task or job without irrelevant thoughts intruding.
0 1 2 3 4 5 6 7 8
Never Extremely Often

17. I pass by school friends, or people I know but have not seen for a long time, unless they speak to me first.
0 1 2 3 4 5 6 7 8
Never Extremely Often

18. I breathe rapidly.
0 1 2 3 4 5 6 7 8
Never Extremely Often

19. I keep busy to avoid uncomfortable thoughts.
0 1 2 3 4 5 6 7 8
Never Extremely Often

20. I can't catch my breath.
0 1 2 3 4 5 6 7 8
Never Extremely Often

21. I can't get some pictures or images out of my mind.
0 1 2 3 4 5 6 7 8
Never Extremely Often

22. I try to avoid social gatherings.
0 1 2 3 4 5 6 7 8
Never Extremely Often

23. My arms or legs feel stiff.
0 1 2 3 4 5 6 7 8
Never Extremely Often

24. I imagine myself appearing foolish with a person whose opinion of me is important.
0 1 2 3 4 5 6 7 8
Never Extremely Often

25. I find myself staying home rather than involving myself in activities outside.
0 1 2 3 4 5 6 7 8
Never Extremely Often

26. I prefer to avoid making specific plans for self-improvement.
0 1 2 3 4 5 6 7 8
Never Extremely Often

27. I am concerned that others might not think well of me.
0 1 2 3 4 5 6 7 8
Never Extremely Often

28. I try to avoid challenging jobs.
0 1 2 3 4 5 6 7 8
Never Extremely Often

29. My muscles twitch or jump.
0 1 2 3 4 5 6 7 8
Never Extremely Often

30. I experience a tingling sensation somewhere in my body.
0 1 2 3 4 5 6 7 8
Never Extremely Often

31. My arms or legs feel weak.
0 1 2 3 4 5 6 7 8
Never Extremely Often

32. I have to be careful to not let my real feelings show.
0 1 2 3 4 5 6 7 8
Never Extremely Often

33. I experience muscular aches and pains.
0 1 2 3 4 5 6 7 8
Never Extremely Often

34. I feel numbness in my face, limbs, or tongue.
0 1 2 3 4 5 6 7 8
Never Extremely Often

35. I experience chest pains.
0 1 2 3 4 5 6 7 8
Never Extremely Often

36. I have an uneasy feelings.
0 1 2 3 4 5 6 7 8
Never Extremely Often

Appendix E

Behavioural Dental Situations

Situation 1: Right now I expect that if I had to make dental appointment, I would:

L1. Do it
L2. Probably do it
L3. Probably not do it
L4. Not do it

Situation 2: Right now I expect that if I had a dental appointment tomorrow, I would:

L1. Go
L2. Probably go
L3. Probably not go
L4. Not go

Situation 3. Right now I expect that if I was waiting in the dentist's office, I would:

L1. Stay
L2. Probably stay
L3. Probably leave
L4. Leave

Situation 4. Right now I expect that if I had to sit in the dentist's chair while he prepares his instruments, I would:

L1. Stay
L2. Probably stay
L3. Probably leave
L4. Leave

Situation 5. Right now I expect that if I was in the dentist's chair and the dentist was ready to work on my mouth, I would:

L1. Stay
L2. Probably stay
L3. Probably leave
L4. Leave

Cognitive Dental Situations

Response choices are the same for all situations.

Situation 1: Right now I expect that if I had to make a dental appointment, I would be:

Situation 2: Right now I expect that if I had a dental appointment tomorrow, I would be:

Situation 3: Right now I expect that if I was waiting in the dentist's office, I would be:

Situation 4: Right now I expect that if I had to sit in the dentist's chair while he prepares his instruments, I would be:

Situation 5: Right now I expect that if I was in the dentist's chair and the dentist was ready to work on my mouth, I would be:

L1. Not concerned - no anticipation of problems
- clear, calm mind

L2. Slightly concerned - think about it once in awhile
- anticipate a little discomfort

L3. Moderately preoccupied - think about if often
- worry about what the dentist will do
- worry about the pain

L4. Severely preoccupied - extremely concerned about negative consequences (e.g., pain)
cannot stop thinking about it

Physiological Dental Situations

Response choices are the same for all situations.

Situation 1: Right now I expect that if I had to make a dental appointment, I would feel:

Situation 2: Right now I expect that if I had a dental appointment tomorrow, I would feel:

Situation 3: Right now I expect that if I was waiting in the dentist's office, I would feel:

Situation 4: Right now I expect that if I had to sit in the dentist's chair while he prepares his instruments, I would feel:

Situation 5: Right now I expect that if I was in the dentist's chair and the dentist was ready to work on my mouth. I would feel:

L1. Calm and relaxed - no appreciable tension

L2. A little tense - slightly aware of body reactions; e.g., heart beats, sweating, etc.

L3. Tense - noticeable physical tension
- showing body reactions; e.g., heart beats, sweating, etc.

L4. Panic - extremely tense body
- excessive body reactions; e.g., heart beats, -sweating, etc.

Appendix F

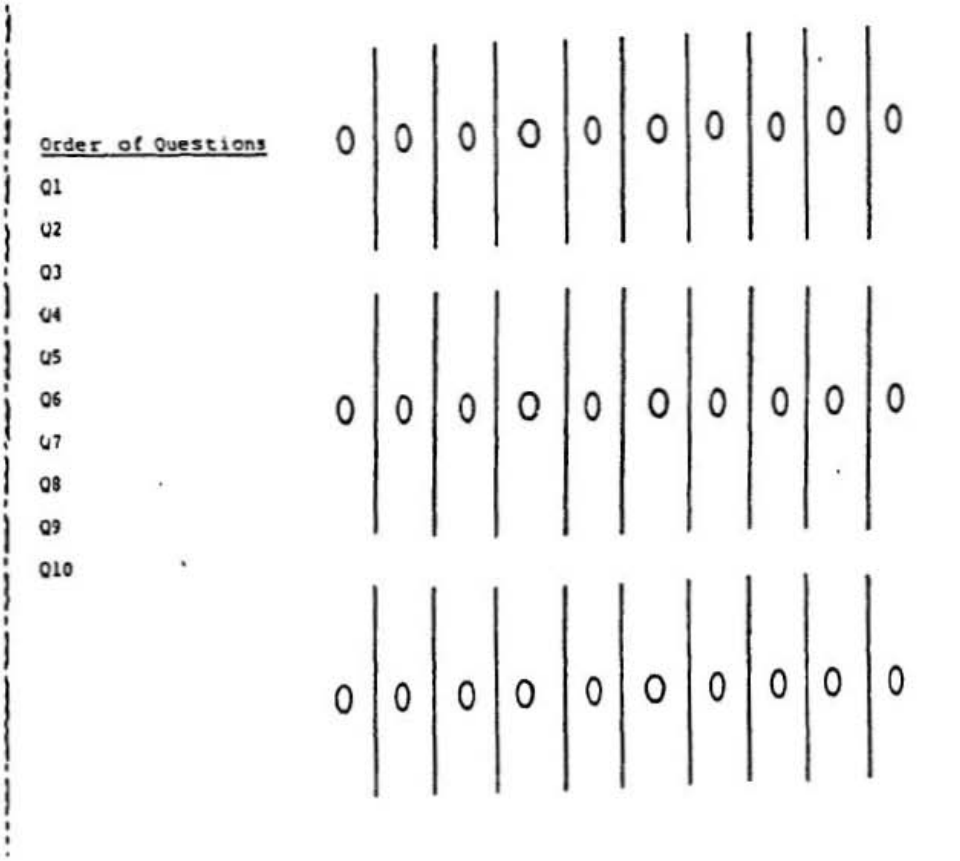
Discan Response Form

INSTRUCTIONS Title: B1

Each page of this booklet consists of some possible answers to the lead-in statement below. From the two or three choices on each page, select the one that is closest to your true state. To record your answer, blacken in the corresponding space on the form below.

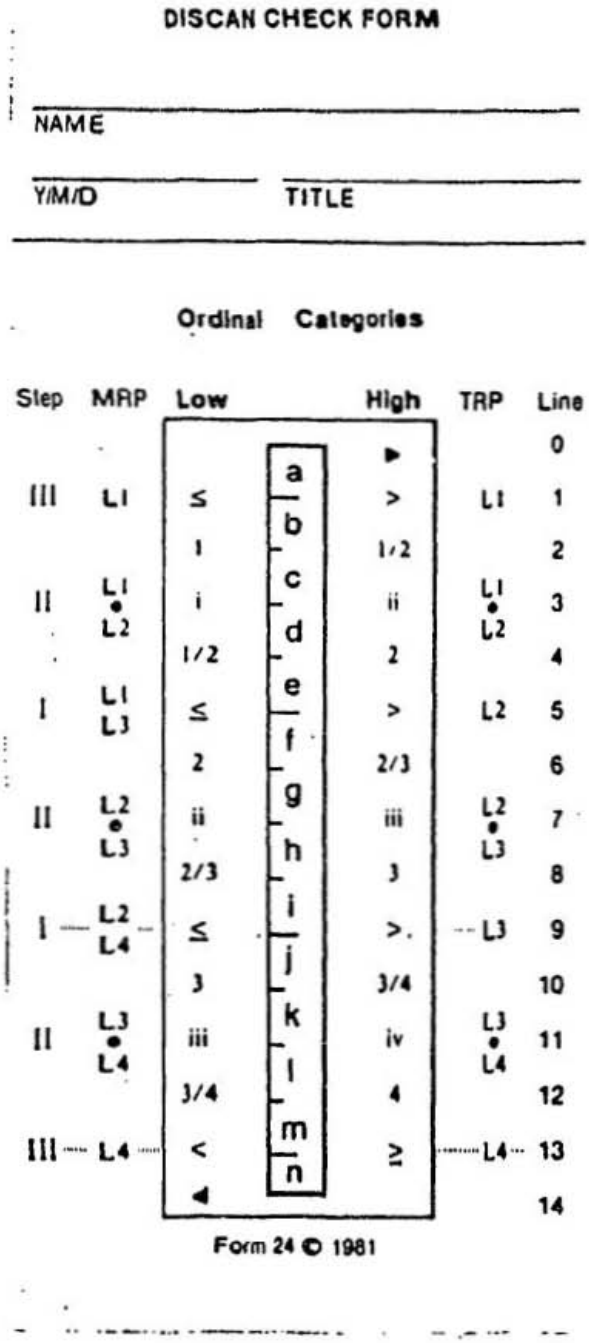
Lead-in: RIGHT NOW I EXPECT THAT IF I HAD TO MAKE A DENTAL APPOINTMENT, I WOULD:

NAME _____ DATE _____ TITLE _____



Appendix G

Discan Check Form



Appendix H

MEMORIAL UNIVERSITY OF NEWFOUNDLAND
St. John's, Newfoundland, Canada A1B 3X9

Department of Psychology

Telex: 016-4101
Tel.: (709) 737-8496

This is to certify that _____ attended
Name

a dental appointment at the _____
Name of Dental Clinic

on _____ at _____.
Date Time

_____
Signature of Dentist

Appendix I

Agenda for Treatment Programme

Session 1:

- Introduction and discussion of the model of therapy.
- Overview of the program.
- Discussion of the 3 components of anxiety.
- Discussion of the effects of anticipatory pain.
- The link between the skills and the model.
- Relaxation technique to help with physiological symptoms.
- Discussion/comments/problems.
- Reminder to make a dental appointment.
- Homework: - progressive muscle relaxation at least 3 times between sessions; monitoring sheets for homework.
- Discan administration.

Session 2:

- Discussion of homework.
- Test progressive muscle relaxation technique.
- Discussion of cognitive aspects: - imagination and negative cognitions.
- Discussion of pain: - worst pain ever felt; tenseness and pain.
- 1st exposure in imagination - making a dental appointment. Consists of 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, and 2 minutes relaxation.
- Checked on dental appointments; clients reminded if appointment was not made and that appointments would be verified.
- Homework: - practice exposure situation with relaxation technique; focus on responses and learn to control them.
- Discan administration.

Session 3:

- Review homework.
- 2nd exposure session: Situations 1 & 2 of Corah - going to the dentist tomorrow, and sitting in the waiting room. Exposure and relaxation alternating the same as in the 1st exposure.
- Reminder to make the dental appointment and verification.
- Homework: - practice imaginal exposure, Situations 1 and 2, using relaxation technique.
- Discan administration.

Session 4:

- Review homework / discuss any problems.
- 3rd imaginal exposure session: Situations 3 and 4 of Corah - sitting in the dentist's chair, and the dentist is ready to work on teeth. Clients were exposed only once to each situation. Alternating the exposure and relaxation was the same as in other sessions.
- Remind to make an appointment / verification.
- Administration of all outcome measures: DAS, Symptom Questionnaire, and the Discans.

Appendix J

RELAXATION TRAINING

Relaxation is like every other skill, the more you practice, the better you'll become. Therefore, it is important to practice the exercises twice a day, for 15-20 minutes each time. Practice sessions consist of tensing each muscle group, noting where it is tense, relaxing it gradually, and concentrating on the difference in these feelings. Do the exercises in a quiet place in a comfortable chair, on the floor with a pillow, or while in bed. Try to do them when there is no time pressure, like after work, before dinner, or before bedtime. Try to avoid any interruptions, like telephone calls or visitors.

1. Clenching fist of dominant hand.
2. Clenching fist of non-dominant hand.
3. Bending wrist of one or both arms.
4. Clenching biceps (one at a time or together).
5. Shrugging shoulders (one at a time or together).
6. Wrinkling forehead.
7. Closing eyes tightly.
8. Pressing tongue or clenching jaws.
9. Pressing lips together.
10. Pressing head back (on chair or pillow).
11. Pushing chin into chest.
12. Arching back.
13. Inhaling and holding chest muscles.
14. Tightening stomach muscles.
15. Contracting buttocks.
16. Stretching legs.
17. Pointing toes toward head.

Relaxation can be practiced while walking by scanning your body and relaxing all the parts except those necessary for walking. You can also do the breathing exercises at the same time.

You can also practice various parts separately throughout the day, especially those areas that are giving you trouble (for example, tightening and relaxing your legs while watching t.v.) You can practice before any event that you anticipate will be anxiety-provoking, practice during that event, and after an event that has made you anxious by taking a deep breath, exhaling, and relaxing all the muscles in your body. If you are very anxious, using this procedure will not completely eliminate anxiety, but keep doing it, and the anxiety can be reduced to a tolerable level.

Appendix K

Scene 1. Making an Appointment

I want you to imagine that you are about to phone to make a dental appointment. (Try to make it as real as you can.) You walk toward the phone, realizing you must look up the dentist's number in the telephone directory. You do that and then pick up the phone. (Try to make it as vivid as possible.) You dial the number. You hear the rings go through as you wait for someone to answer. A secretary answers by giving the name of the dental clinic. You say who you are and that you would like to make an appointment. (Try to make it as real as possible.) She looks in the appointment book and you discuss a suitable time. She repeats the day and the time so you can write it down. You thank her and hang up the receiver.

Scene 2. Dental Appointment

I want you to imagine that you have a dental appointment tomorrow. (Try to make it as real as you can.) You are thinking about the appointment that you have to go to tomorrow. You check the time of the appointment and begin to plan as to how you will get there. (Try to make it as vivid as possible.) Bring up all the feelings that you feel when you think about going to the dentist tomorrow. You wonder what the dentist will say or do. (Try to make it as real as possible.)

Scene 3. Waiting Room

I want you to imagine that you are sitting in the waiting room of the dental clinic. (Try to make it as real as you can.) You have given your name to the receptionist. After checking off your name, she asked you to take a seat. You have taken off your coat and made yourself comfortable. (Try to make it as vivid

as possible.) You sit in the room noticing the pictures on the wall and the other people waiting. You look through a stack of magazines and choose one that seems interesting. (Try to make it as real as possible.) You look through the magazine while you wait to hear your name called. You hear the receptionist call your name.

Scene 4. Dental Chair

I want you to imagine that you are now sitting in the dentist's chair. (Try to make it as real as you can.) You are tilted back in the chair and looking toward the ceiling. The assistant puts the paper bib around your neck and turns the light toward you. (Try to make it as vivid as possible.) You can hear the dentist washing his hands. The dentist comes over by the chair and adjusts his table. You hear him setting his instruments on the tray. (Try to make it as real as possible.)

Scene 5. Dentist

I want you to imagine that the dentist is ready to work on your mouth. (Try to make it as real as you can.) The dentist finishes arranging the instruments on the tray. He asks how you are today and you reply. He sits on the stool beside your chair. (Try to make it as vivid as possible.) He adjusts the light and tells you to open your mouth. You see him reach for an instrument. He is now ready to work on your mouth. (Try to make it as real as possible.)

Appendix L

Raw data: Corah Dental Anxiety Scale

Corah Dental Anxiety Scale Scores

	Subjects	Pretreatment	Post-treatment	Post-dentist	One week follow-up	Six month follow-up
Spaced group	1	16	11	10	10	8
	2	17	11	11	9	9
	3	13	11	11	8	8
	4	20	14	12	12	11
	5	18	9	9	9	4
	6	18	11	11	11	11
Massed group	1	18	9	6	6	4
	2	19	12	9	9	6
	3	15	9	8	9	9
	4	17	11	9	10	5
	5	19	8	8	4	4
	6	19	17	9	9	7

Raw data: Lehrer and Woolfolk Symptom Questionnaire for the spaced group

Lehrer and Woolfolk Symptom Questionnaire Scores

Subjects	Pretreatment	Post-treatment	Six month follow-up
		Physiological	
1	34	44	18
2	30	21	12
3	34	43	27
4	36	53	42
5	37	27	29
6	37	49	32
		Cognitive	
1	30	33	25
2	29	29	16
3	59	54	43
4	31	33	28
5	24	21	25
6	34	34	29
		Behavioural	
1	26	32	21
2	36	26	11
3	25	32	38
4	21	16	10
5	14	26	24
6	17	22	28

Raw data: Lehrer and Woolfolk Symptom Questionnaire for the massed group

Lehrer and Woolfolk Symptom Questionnaire Scores

Subjects	Pretreatment	Post-treatment	Six month follow-up
		Physiological	
1	0	2	1
2	35	21	3
3	55	41	37
4	46	24	16
5	21	16	0
6	51	56	49
		Cognitive	
1	21	13	10
2	55	5	41
3	42	40	32
4	31	20	20
5	37	17	0
6	61	68	51
		Behavioural	
1	5	3	2
2	18	56	5
3	37	28	26
4	38	11	17
5	24	9	0
6	25	28	26

Raw data for pretreatment Discans - completers

	Dental Situations														
	Behavioural					Cognitive					Physiological				
Group	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Spaced															
Subjects															
1	13	5	5	5	5	13	13	13	10	11	7	6	7	7	7
2	13	5	1	10	1	6	6	10	13	13	5	1	6	13	13
3	1	1	1	1	1	9	13	13	13	13	12	9	12	13	9
4	13	10	10	13	11	13	13	13	13	13	13	12	11	13	13
5	5	1	1	1	1	13	10	12	13	12	9	6	8	9	9
6	1	6	4	1	1	11	9	13	12	13	9	9	11	9	9
Massed															
Subjects															
1	1	1	1	1	1	14	14	14	14	14	6	14	14	14	14
2	1	1	1	5	1	10	13	13	13	13	3	13	13	13	10
3	6	2	2	2	2	9	9	9	9	10	9	6	6	9	9
4	6	3	3	6	5	8	9	9	10	13	6	9	6	12	9
5	10	13	5	4	5	13	11	13	13	10	9	6	6	9	10
6	7	8	7	8	9	14	14	14	14	14	13	14	13	13	14

Raw data for Session 1 Discans - completers

	Dental Situations														
	Behavioural					Cognitive					Physiological				
Group	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Spaced															
Subjects															
1	4	4	1	1	1	7	8	6	6	6	6	6	6	6	6
2	1	5	1	1	1	6	6	6	14	14	5	6	6	10	14
3	1	1	1	1	1	7	10	9	13	10	9	9	9	9	9
4	13	13	13	14	13	13	13	13	13	13	13	13	13	13	13
5	1	1	1	1	1	13	13	12	13	13	9	6	9	9	8
6	1	5	4	4	5	6	9	13	13	13	7	9	9	9	9
Massed															
Subjects															
1	1	1	1	1	1	10	14	14	14	14	14	14	14	14	14
2	1	1	1	1	1	9	13	13	13	13	6	9	9	6	8
3	1	1	1	1	1	5	5	9	9	10	6	1	6	9	9
4	6	9	1	1	1	9	10	9	13	13	6	9	13	13	13
5	5	5	5	5	5	9	10	9	10	10	6	6	6	6	6
6	7	7	7	7	6	10	13	10	13	13	10	13	9	13	9

Raw data for Session 2 Discans - completers

	Dental Situations														
	Behavioural					Cognitive					Physiological				
Group	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Spaced															
Subjects															
1	5	5	5	3	3	8	6	7	6	7	7	7	6	7	6
2	1	5	5	1	1	5	5	6	13	14	1	5	6	13	13
3	1	1	1	1	1	5	13	13	10	13	5	6	9	6	9
4	6	10	10	13	13	10	13	13	13	13	9	13	13	13	13
5	1	1	1	1	1	8	13	9	8	8	9	9	9	8	9
6	1	4	4	5	1	5	8	10	7	7	6	9	7	8	8
Massed															
Subjects															
1	1	1	1	1	1	6	6	6	6	9	6	6	6	6	6
2	1	1	1	1	1	4	8	9	9	9	6	7	7	8	9
3	1	1	1	1	1	6	6	9	10	9	1	6	6	9	9
4	1	1	1	1	1	5	6	6	6	9	1	6	5	9	13
5	1	5	1	1	1	9	9	9	9	6	6	6	6	6	9
6	7	8	7	8	9	14	14	14	14	14	13	14	13	13	14

Raw data for Session 3 Discans - completers

	Dental Situations														
	Behavioural					Cognitive					Physiological				
Group	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Spaced															
Subjects															
1	1	1	1	3	3	8	8	9	8	8	6	7	6	6	7
2	1	1	1	1	1	6	6	10	13	14	1	9	6	13	13
3	1	1	1	1	1	6	9	9	9	9	1	6	6	6	6
4	6	10	9	13	13	9	13	13	13	13	6	13	10	10	10
5	1	1	1	1	1	6	6	8	6	6	6	6	6	6	7
6	3	1	1	6	1	9	9	12	8	8	9	7	8	9	9
Massed															
Subjects															
1	1	1	1	1	1	5	1	6	6	6	3	5	6	6	6
2	1	1	1	1	1	3	5	6	10	10	3	3	6	6	8
3	1	1	1	1	1	5	1	6	9	9	4	1	2	6	6
4	1	1	1	1	1	5	5	1	8	5	5	1	1	8	9
5	1	1	1	1	1	1	5	1	5	1	3	1	1	6	6
6	1	5	1	6	1	5	6	9	13	13	5	10	13	13	13

Raw data for Session 4 Discans - completers

	Dental Situations														
	Behavioural					Cognitive					Physiological				
Group	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Spaced															
Subjects															
1	1	1	1	2	1	7	8	7	6	8	6	6	7	7	7
2	1	1	1	1	1	5	6	9	13	13	1	5	6	9	9
3	1	3	1	1	1	1	9	9	9	9	1	9	9	9	9
4	1	1	5	5	5	5	5	6	9	9	6	9	9	9	9
5	1	1	1	1	1	1	6	6	6	6	3	6	6	6	6
6	1	1	1	1	1	4	6	7	7	7	5	6	6	7	7
Massed															
Subjects															
1	1	1	1	1	1	1	1	5	1	1	1	1	1	6	5
2	1	1	1	1	1	3	5	6	9	7	1	3	6	9	7
3	1	1	1	1	1	2	5	6	9	8	2	2	5	6	6
4	1	1	1	1	1	1	1	1	5	6	1	1	1	6	6
5	1	1	1	1	1	3	5	5	5	1	5	1	1	5	5
6	6	6	1	9	9	6	13	13	13	13	5	13	13	13	9

Raw data for Follow-up 1 Discans - completers

	Dental Situations														
	Behavioural					Cognitive					Physiological				
Group	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Spaced															
Subjects															
1	1	1	1	1	1	6	6	6	7	8	6	6	7	6	7
2	5	1	1	1	1	6	6	6	10	6	1	5	5	9	9
3	1	1	1	1	1	1	5	5	6	6	6	6	6	6	6
4	5	6	1	5	5	6	9	9	10	9	6	9	9	9	9
5	1	1	1	1	1	1	5	5	5	5	3	1	5	5	5
6	1	1	1	1	1	1	5	6	6	7	6	6	6	7	7
Massed															
Subjects															
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	5	3	5	6	4	1	3	3	4	6
3	1	1	1	1	1	5	5	5	6	6	2	1	6	6	6
4	1	1	1	1	1	1	1	4	6	6	1	6	2	6	6
5	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1
6	1	1	1	1	1	5	6	6	9	9	9	6	9	9	9

Raw data for Follow-up 2 Discans - completers

	Dental Situations														
	Behavioural					Cognitive					Physiological				
Group	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Spaced															
Subjects															
1	5	4	1	5	1	5	3	6	6	6	4	5	4	5	-
2	1	1	1	1	1	1	5	6	9	6	1	1	5	6	9
3	1	1	1	1	1	1	5	5	5	5	1	5	5	5	5
4	1	1	1	1	1	6	6	6	5	6	6	6	6	6	9
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	3	1	1	1	3	4	7	7	7	3	6	6	7	7
Massed															
Subjects															
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	3	4
3	1	1	1	1	1	1	5	5	4	5	3	3	4	4	5
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	5	5	5	5	5	6	6	5	6	6

Appendix M

T-test comparisons between treatment completers (n = 12) and non-completers (n = 6) on demographic, dental history, and pretreatment variables

Demographic/Dental history		t scores	df	p
Age		.88	16	.40
Education		-1.03	16	.32
Last dental visit		-1.03	16	.32
Years of dental avoidance		-1.12	16	.28
Pretreatment Measures				
Corah DAS		-.84	16	.41
Symptom Questionnaire				
Physiological		-.61	16	.55
Cognitive		.73	16	.47
Behavioural		-.77	16	.45
Discans				
Behavioural -	Situation 1	.15	16	.88
	Situation 2	-.07	16	.94
	Situation 3	.49	16	.63
	Situation 4	-.46	16	.65
	Situation 5	.04	16	.97
Cognitive -	Situation 1	-.66	16	.52
	Situation 2	.27	16	.79
	Situation 3	-.17	16	.87
	Situation 4	.85	16	.41
	Situation 5	2.12	16	.05*
Physiological -	Situation 1	.34	16	.74
	Situation 2	.49	16	.63
	Situation 3	-.16	16	.87
	Situation 4	-.56	16	.58
	Situation 5	-.26	16	.80

* $p < .05$

Appendix N

Fisher's exact test comparisons between treatment completers (n = 12) and non-completers (n =6) demographic and dental history variables

Demographic/Dental history	Fisher's p
Sex	.59
Martial status	.12
Avoidance due to fear	.76
Avoid dental topics	.12
Negative childhood dental experiences	.41